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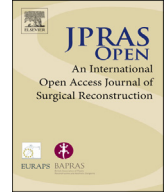
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## Case Report

# Re-exploration of vertical rectus abdominis myocutaneous flap for vaginal reconstruction: Case report and review of the literature

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## ABSTRACT

The vertical rectus abdominis myocutaneous (VRAM) flap is a versatile and well-established reconstructive technique for many defects created as a result of colorectal and gynecologic extirpation. However, major re-operation in the pelvis following a VRAM flap reconstruction several months later is uncommon, and the safety and integrity of the VRAM flap in this setting has not been described. This case examines VRAM flap preservation during repeat exploratory laparotomy, and a unique view of the VRAM flap during interval exploration. We demonstrate an intact flap after lysis of adhesions with an audible Doppler signal, and maintenance of flap integrity in the postoperative period. This further substantiates its use as a durable rotational flap for perineal tissue defects.

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## Introduction

The vertical rectus abdominis myocutaneous (VRAM) flap is a well-established and preferred reconstructive technique for many defects created as a result of colorectal and gynecologic extirpation.<sup>1–5</sup> Malignancies of the distal colon, rectum, anal canal, bladder, sexual organs, endometrium, cervix, and vagina often require extensive pelvic surgery, and frequently involve associated radiation therapy.<sup>6</sup> In these scenarios, the advantages of the VRAM flap include many anatomic and functional considerations. Anatomically, the inferior epigastric vessels about which the flap is oriented allow for transposition deep into the pelvis to fill dead space and reconstruct virtually any component of pelvic anatomy.<sup>1,7</sup> This is done using the same primary incision, thus minimizing donor site morbidity. Functionally, the rectus muscle and overlying subcutaneous tissue and skin allow for healthy, non-irradiated tissue to fill dead space and provide increased tissue healing potential to an often-compromised area.<sup>6</sup> When used for vaginal reconstruction, sexual function can be preserved.<sup>7,8</sup>

While known to be a durable reconstructive technique, no study has evaluated the safety and reliability of flap integrity during major pelvic re-operation. This case examines anatomic and functional considerations during preservation of a VRAM flap during repeat exploratory laparotomy.

## Case report

The patient is a 59-year-old female, who in December 2015 was diagnosed with a locally advanced distal rectal cancer with a rectovaginal fistula. She completed neoadjuvant chemoradiation after a diverting colostomy and in April 2016 underwent an abdominoperineal proctectomy with posterior vaginectomy, a perineal/posterior vaginal wall reconstruction with a VRAM flap.

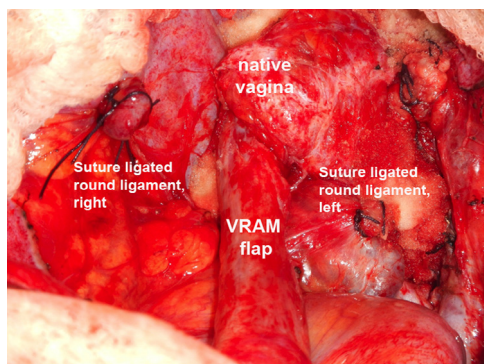
At the index operation, the VRAM flap was created using the inferior midline incision used during proctectomy. The right rectus abdominis muscle was isolated along with its overlying elliptical skin paddle. Great care was taken to secure the skin and anterior fascia so as to not apply shear force to the muscle and compromise the flap as the right inferior epigastric vessels were skeletonized and isolated. The flap was tunneled to the perineum, where the most superior portion of this elliptical skin paddle became the posterior vagina. A pre-sacral closed suction drain was then placed. In the abdomen, the peritoneum and anterior fascia were each closed making sure there was no compression on the muscle/deep inferior epigastric vessels. The superior anterior elliptical fascial deficit was reconstructed with Strattice™ (LifeCell division of KCI) mesh and skin flaps were mobilized and brought together over a closed suction drain. At its conclusion, the flap had an audible Doppler signal and 2–3 second capillary refill.

The patient did well after the initial operation and did not have evidence of locally recurrent disease. However, she was subsequently diagnosed with Lynch Syndrome and on surveillance colonoscopy was found to have a transverse colon polyp that was found to harbor an invasive adenocarcinoma. Surveillance of her colon was no longer deemed an advisable option, and she was thus counseled regarding the increased lifetime risk of uterine and ovarian cancer with Lynch Syndrome.<sup>9,10</sup> A multidisciplinary recommendation for total colectomy, end ileostomy, and hysterectomy was proposed. Plastic surgery was requested to help during the surgery to preserve the VRAM flap perineal reconstruction.

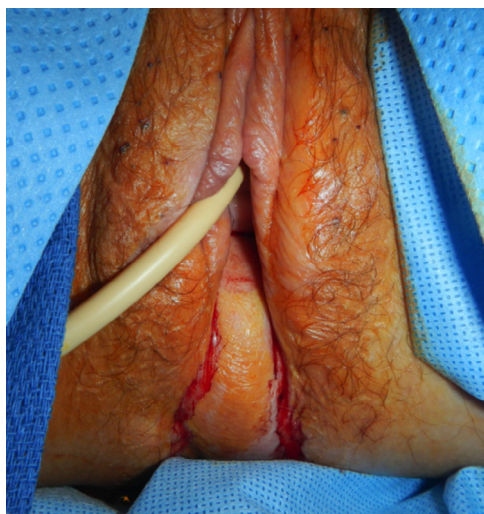
In January 2017 she underwent repeat exploratory laparotomy with total abdominal colectomy, end ileostomy, total abdominal hysterectomy, bilateral salpingo-oophorectomy, lysis of adhesions, and preservation of the VRAM flap. On exploration of the VRAM flap, the pedicle had an audible Doppler signal and was clearly viable, as was the skin paddle reconstructing the posterior vaginal wall ([Figure 1 and 2](#)). Careful lysis of adhesions allowed for the safe removal of her remaining colon, as well as uterus ovaries, and fallopian tubes.

## Discussion

This case adds to the body of literature highlighting the use of VRAM flaps in pelvic reconstruction following oncologic resection, but is the first to demonstrate the safety and reliability of flap preservation during major re-operation.



**Figure 1.** Intraoperative view during re-exploration 9 months from index surgery for definitive surgery following diagnosis of Lynch Syndrome. The VRAM flap can be seen viable and perfused, successfully reconstructing the posterior vagina.



**Figure 2.** External view during re-exploration 9 months from index surgery for definitive surgery following diagnosis of Lynch Syndrome. The skin paddle of the VRAM flap remains perfused and intact, successfully reconstructing the posterior vaginal wall.

Many studies have established the flap specific morbidity associated with VRAM flap reconstruction, which can include donor site morbidity, perineal wound complications, partial/total flap loss, rectovaginal fistulae, and vaginal prolapse.<sup>3,6,8,11–13</sup> Focusing on flap specific morbidity, the most frequent complication is a perineal wound infection or partial perineal wound dehiscence, occurring up to 26% in some series.<sup>3,6,11,12</sup> Partial necrosis requiring minor debridement has been reported at 5–10%.<sup>11</sup> Total flap loss is very low at 0–4% in multiple series.<sup>3,6,11,12</sup>

In this case, we report a persistent patent pedicle with an audible Doppler signal at 9 months from the index operation, establishing the reliability of the inferior epigastric blood supply. Whether disruption of this vascular pedicle during the lysis of adhesions would have led to subsequent flap loss is unknown, but it does suggest the durability of a VRAM flap to withstand interval re-operation. One known risk of any rectus abdominis myocutaneous flap is that it is supplied only through the

inferior epigastric vessels, without a secondary blood supply.<sup>2</sup> Therefore, in patients with multiple previous abdominal operations the risk of flap loss is elevated.<sup>2</sup>

Evidence from the free tissue transfer literature suggests that free flaps can gain independence from their vascular pedicle due to neovascularization as early as 6 days.<sup>14</sup> Similarly, conventional practice for rotational flaps that need interval division (e.g. forehead flap), survive via neovascularization. This phenomenon has not been studied with large volume rotational tissue transfers such as VRAM flaps. Even so, we are confident that this case represents a good demonstration of the safety of major reoperation in the presence of VRAM flaps.

### Conflict of interest

None.

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### References

- Carlson JW, Soisson AP, Fowler JM, Carter JR, Twiggs LB, Carson LF. Rectus abdominis myocutaneous flap for primary vaginal reconstruction. *Gynecol Oncol*. 1993;51:323–329. doi:10.1006/gyno.1993.1298.
- Carlson JW, Carter JR, Saltzman AK, Carson LF, Fowler JM, Twiggs LB. Gynecologic reconstruction with a rectus abdominis myocutaneous flap: an update. *Gynecol Oncol*. 1996;61:364–368. doi:10.1006/gyno.1996.0157. 0090–8258 (Print).
- Bakx R, Van Lanschot JJB, Zoetmulder FAN. Inferiorly based rectus abdominis myocutaneous flaps in surgical oncology: indications, technique, and experience in 37 patients. *J Surg Oncol*. 2004;85:93–97. doi:10.1002/jso.20014.
- Tei TM, Stolzenburg T, Buntzen S, Laurberg S, Kjeldsen H. Use of transpelvic rectus abdominis musculocutaneous flap for anal cancer salvage surgery. *Br J Surg*. 2003;90:575–580. doi:10.1002/bjs.4073.
- Bell SW, Dehni N, Chaouat M, Lifante JC, Parc R, Tiret E. Primary rectus abdominis myocutaneous flap for repair of perineal and vaginal defects after extended abdominoperineal resection. *Br J Surg*. 2005;92:482–486. doi:10.1002/bjs.4857.
- Butler CE, Gündeslioglu AO, Rodriguez-Bigas MA. Outcomes of immediate vertical rectus abdominis myocutaneous flap reconstruction for irradiated abdominoperineal resection defects. *J Am Coll Surg*. 2008;206:694–703. doi:10.1016/j.jamcollsurg.2007.12.007.
- Smith HO, Genesen MC, Runowicz CD, Goldberg GL, Abdominis R, Flap M. Modifications, complications, and sexual function. *Cancer*. 1998;83:510–520.
- D'Souza DN, Pera M, Nelson H, Finical SJ, Tran NV. Vaginal reconstruction following resection of primary locally advanced and recurrent colorectal malignancies. *Arch Surg*. 2003;138:1340–1343. doi:10.1001/archsurg.138.12.1340.
- Obermair A, Youlden DR, Young JP, et al. Risk of endometrial cancer for women diagnosed with HNPCC-related colorectal carcinoma. *Int J Cancer*. 2010;127:2678–2684. doi:10.1002/ijc.25501.
- Giardiello FM, Allen JJ, Axilbund JE, et al. Guidelines on genetic evaluation and management of Lynch syndrome: a consensus statement by the US Multi-Society Task Force on colorectal cancer. *Gastroenterology*. 2014;147:502–526. doi:10.1053/j.gastro.2014.04.001.
- Soper JT, Secord AA, Havrilesky LJ, Berchuck A, Clarke-Pearson DL. Comparison of gracilis and rectus abdominis myocutaneous flap neovaginal reconstruction performed during radical pelvic surgery: flap-specific morbidity. *Int J Gynecol Cancer*. 2007;17:298–303. doi:10.1111/j.1525-1438.2007.00784.x.
- Houvenaeghel G, Ghouti L, Moutardier V, Buttarelli M, Lelong B, Delperro JR. Rectus abdominis myocutaneous flap in radical oncopelvic surgery: a safe and useful procedure. *Eur J Surg Oncol*. 2005;31:1185–1190. doi:10.1016/j.ejso.2005.07.004.
- Sunesen KG, Buntzen S, Tei T, Lindegaard JC, Nørgaard M, Laurberg S. Perineal healing and survival after anal cancer salvage surgery: 10-year experience with primary perineal reconstruction using the vertical rectus abdominis myocutaneous (VRAM) flap. *Ann Surg Oncol*. 2009;16:68–77. doi:10.1245/s10434-008-0208-4.
- Yoon AP, Jones NF. Critical time for neovascularization/angiogenesis to allow free flap survival after delayed postoperative anastomotic compromise without surgical intervention: a review of the literature. *Microsurgery*. 2016;36:604–612. doi:10.1002/micr.30082.